Ref: 8410579

October 29, 2013

Mr. Jim Lance
City Attorney
City of Willits
300 Robinson Creek Rd
Ukiah, CA 95482

RE: City of Willits Wastewater Treatment Plant Water Balance

Dear Mr. Lance,

Based on our conversations and your request GHD has completed a water balance calculation to provide an accounting of the influent and effluent flows to the City of Willits Wastewater Treatment Plant (WWTP). A copy of the water balance is attached for your reference.

The water balance accounts for wastewater flows into and out of the WWTP. Influent flows consist of metered influent flows and precipitation. Effluent flows consist of metered discharge to either Outlet Creek or irrigation and evaporation from the WWTP unit processes, ponds and newly constructed wetlands and some water supplied to Caltrans for construction. In addition, the underlying soils of the wetlands will have some minor seepage due to the permeability of the structure, pond or wetland cell. The Regional Water Quality Control Board has acknowledged the potential for minor seepage in Attachment F item VI.B.9 of the WDR Order NO. R1-2010-0017 and placed effluent limitations for total nitrogen from the new mechanical secondary treatment system due to the potential for minor seepage.

The water balance calculation is based on metered influent sanitary sewer flows, metered effluent flows to Outlet Creek and irrigation, localized precipitation data, estimates of evaporation based on historical pan evaporation data and storage of treated effluent in the ponds prior to discharge. The period used for the water balance is for the 12 month period following construction of the WWTP improvement project after it was placed into operation. Data for the previous years is not accurate or reflective of the system as it currently operates and also had data flaws in the metered flows due to the ongoing construction. Based on the water balance there is an estimated unaccounted for loss of approximately 9.42 million gallons of treated wastewater over the period of record. This loss is the equivalent of approximately .03 inches/day distributed over the wetland area. This loss can be accounted and attributed to permeability as previously discussed and evapotranspiration through the plants in the wetlands. Discounting the evapotranspiration the losses would equate to a permeability of approximately 1.0×10^{-6} cm/sec in the underlying soils compacted beneath the constructed wetlands.

SHN Consulting Engineers & Geologists completed geotechnical studies for the WWTP improvements. They report relatively low permeability of the undisturbed underlying soils at the site in the range of 3×10^{-7} cm/sec to 9×10^{-6} cm/sec in their Geotechnical Report Stage 2 and 3 Improvements dated March 2008. The wetlands were allowed to be constructed with these on site soils by the RWQCB as permitted under WDR Order NO. R1-2010-001. The WDR Order NO. R1-2010-0017 for the City did not prescribe quantitative limits on the permeability of the soils that were used to construct the wetlands but in our experience with other projects 1.0×10^{-6} cm/sec has been an acceptable and prescribed permeability for clay linings of treated wastewater holding ponds for other projects. A permeability of 1.0×10^{-6} cm/sec is synonymous with low permeability as prescribed by the RWQCB. GHD can provide reference projects listed under the jurisdiction of the RWQCB that have specific quantitative limits and low permeability

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requirements of 1.0 x 10^{-6} cm/sec for clay linings and permeability if required. In our opinion based on our review of the data and operations the City of Willits WWTP is operating within the requirements of Order No. R1-2010-0017 and is not in violation of the requirements of the Waste Discharge and Master Reclamation Permit.

If you have any questions, please feel free to contact me.

Sincerely,
GHD Inc.

Alex Culick, P.E.
Managing Principal

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